

# Groundwater Data Management System (DMS)



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# Sacramento Groundwater Authority (SGA)

- Formed to Implement Groundwater Management in the North Sacramento Region
- Phase 1- Develop demonstration level DMS
- Phase 2 - continue development of DMS and fully populate data for all SGA Wells



# Data Management Needs...

- Data Storage and Security
- Well Location and Siting Constraints
- Construction and Plumbing
- Aquifer Characterization
- Long-term Monitoring
  - Extraction Volumes
  - Water Elevations
  - Water Quality
  - Injection



# Data Management Needs...

- Analytical Tools
- Presentation Tools



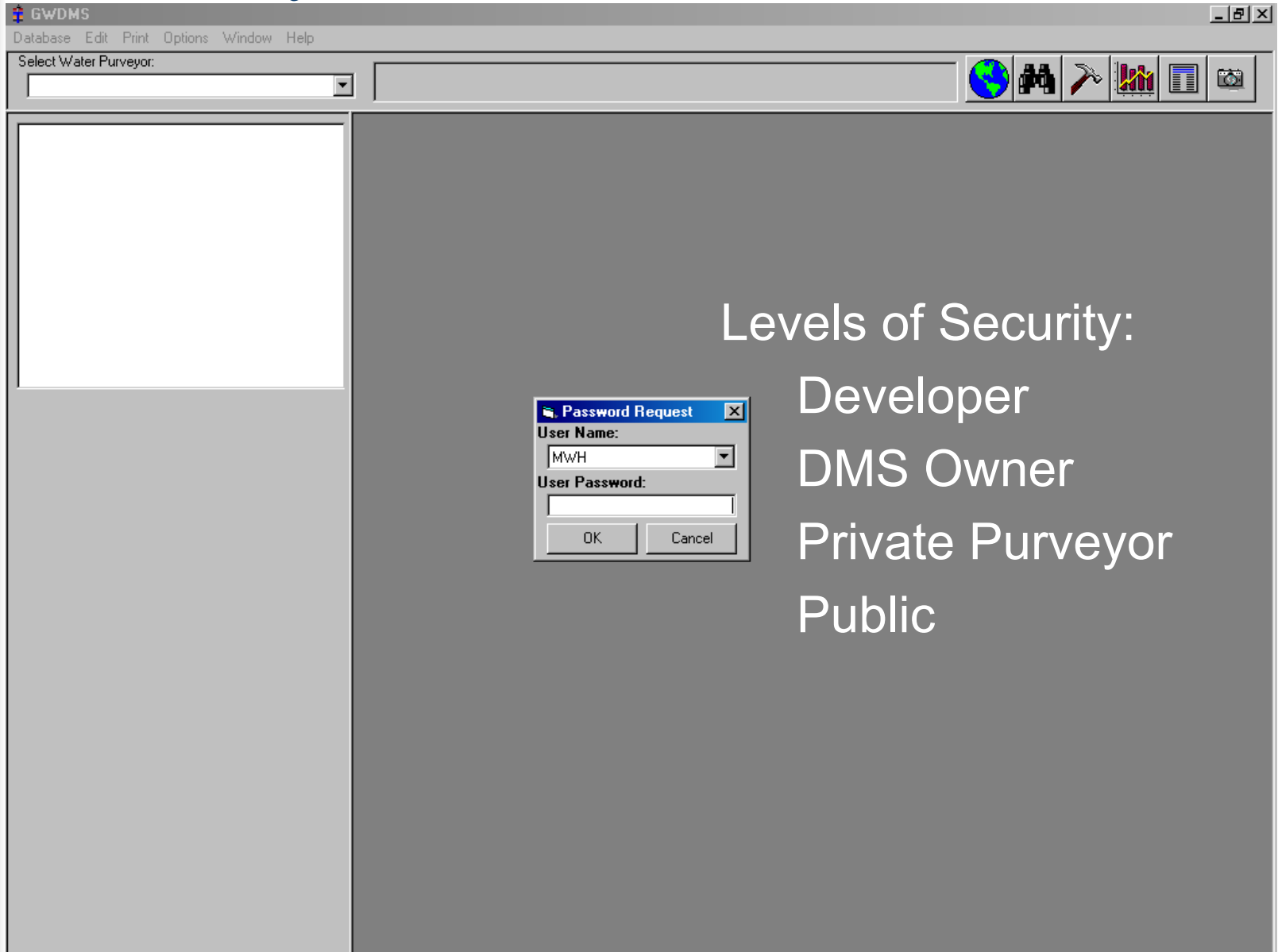
# DMS vs. Data

- DMS is a stand-alone executable application developed in Visual Basic.
- DMS controls database transactions.
- DMS can be applied to any groundwater basin.

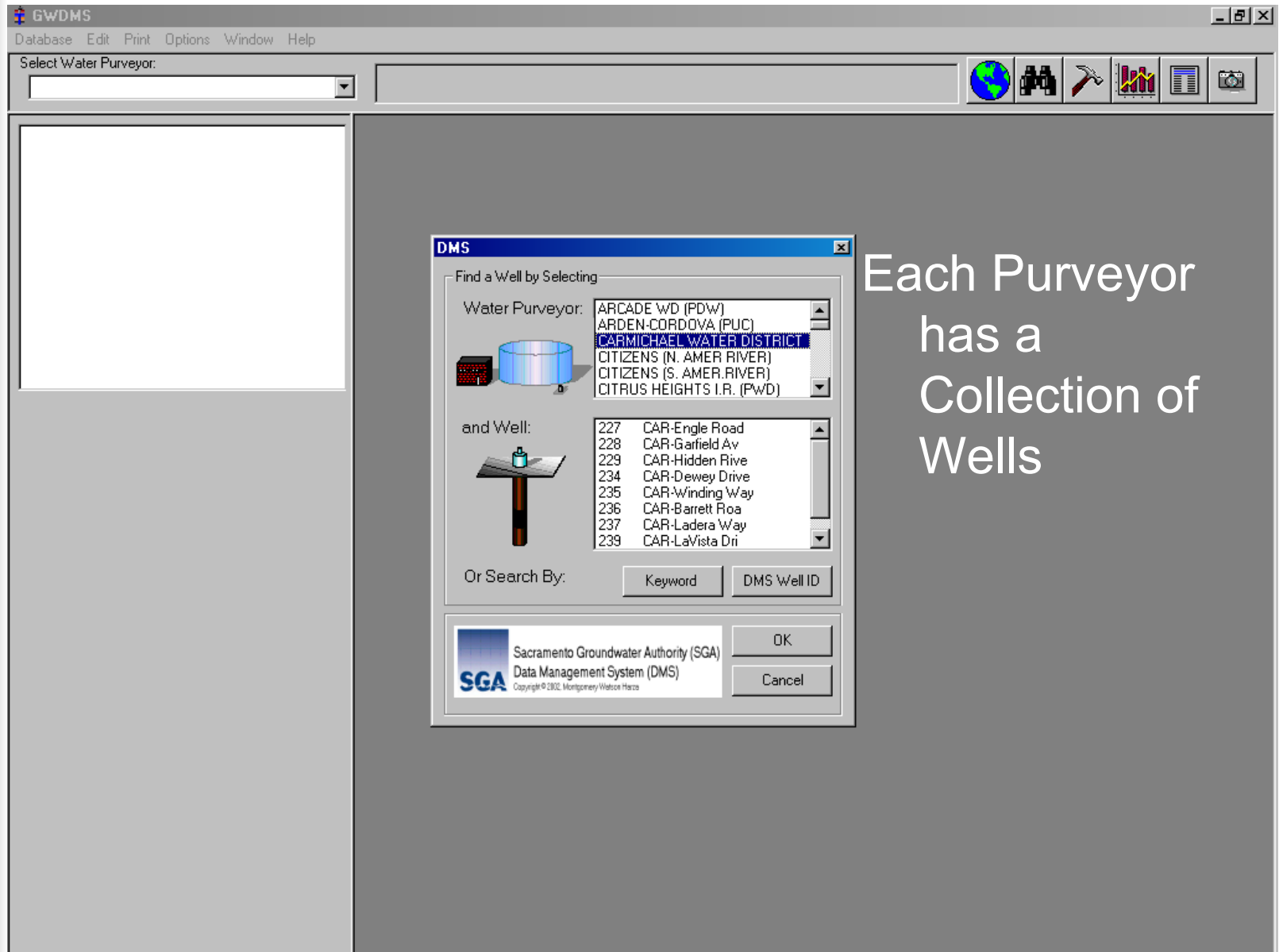


# DMS Walk Through...

# Security and User Access



# Purveyor/Well Relationship





# Well Information and Attributes

**GWDMS - [NORTHRIDGE WATER DISTRICT - Well Inventory]**

Database Edit Print Options Window Help

Select Water Purveyor: **NORTHRIDGE WATER DISTRICT**

Well ID: 22 State Well ID: 09N/05E-12B01  
Purveyor Well ID: Well Name: NOR-17

**NORTHRIDGE WATER DISTRICT - Well Inventory**

Well Location Well Construction Pump/Motor Info Geo-Aqui Info Wellhead Protection GW Levels GW Extraction  
Surface Water Well Injection Water Quality Well Images

| Well ID   | Well Name     | Agency System ID | Region ID  | State Well ID       | Primary Station Code (DHS ID) | Well Group ID | Purveyor Well ID |
|-----------|---------------|------------------|------------|---------------------|-------------------------------|---------------|------------------|
| 5         | NOR-15        | NOR              | SGA        | 09N/06E-06A0        |                               |               |                  |
| 6         | NOR-11        | NOR              | SGA        | 10N/06E-32N0        |                               |               |                  |
| 7         | NOR-10        | NOR              | SGA        | 09N/06E-05F0        |                               |               |                  |
| 8         | NOR-07        | NOR              | SGA        | 10N/06E-33N0        | 3410024005                    |               |                  |
| 9         | NOR-06        | NOR              | SGA        | 09N/06E-04D0        | 3410024004                    |               |                  |
| 21        | NOR-14        | NOR              | SGA        | 09N/05E-12M0        |                               |               |                  |
| <b>22</b> | <b>NOR-17</b> | <b>NOR</b>       | <b>SGA</b> | <b>09N/05E-12B0</b> |                               |               |                  |
| 23        | NOR-21        | NOR              | SGA        | 09N/06E-37E0        |                               |               |                  |
| 24        | NOR-23        | NOR              | SGA        | 09N/06E-06R0        |                               |               |                  |
| 25        | NOR-22        | NOR              | SGA        | 09N/06E-07H0        |                               |               |                  |
| 26        | NOR-09        | NOR              | SGA        | 09N/06E-08H0        | 3410024007                    |               |                  |
| 60        | NOR-01        | NOR              | SGA        | 09N/06E-07Q0        |                               |               |                  |
| 62        | NOR-03        | NOR              | SGA        | 09N/06E-18J0        |                               |               |                  |
| 63        | NOR-20        | NOR              | SGA        | 09N/06E-17B0        |                               |               |                  |
| 345       | NOR-05        | NOR              | SGA        | 10N/06E-31A0        | 3410024003                    |               |                  |
| 346       | NOR-08        | NOR              | SGA        | 10N/06E-33F0        | 3410024006                    |               |                  |
| 347       | NOR-12        | NOR              | SGA        | 09N/06E-09D0        |                               |               |                  |
| 348       | NOR-18        | NOR              | SGA        | 10N/06E-32D0        |                               |               |                  |
| 349       | NOR-24        | NOR              | SGA        | 10N/06E-30K0        |                               |               |                  |
| 350       | NOR-25        | NOR              | SGA        | 10N/06E-30G0        |                               |               |                  |
| 351       | NOR-26        | NOR              | SGA        | 10N/06E-29D0        |                               |               |                  |
| 352       | NOR-27        | NOR              | SGA        | 09N/06E-10D0        |                               |               |                  |
| 353       | NOR-28        | NOR              | SGA        | 09N/06E-03C0        |                               |               |                  |
| 354       | NOR-29        | NOR              | SGA        | 09N/06E-04G0        |                               |               |                  |
| 355       | NOR-30        | NOR              | SGA        | 10N/06E-34M0        |                               |               |                  |
| 356       | NOR-31        | NOR              | SGA        | 09N/06E-09G0        |                               |               |                  |
| 357       | NOR-32A       | NOR              | SGA        | 10N/06E-21F0        |                               |               |                  |
| 358       | NOR-32B       | NOR              | SGA        | 10N/06E-21F0        |                               |               |                  |
| 475       | NOR-34        | NOR              | SGA        | 3410024-032         |                               |               |                  |

Row 6 of 28

# Organization of Display

**GW DMS**  
Database Edit Print Options Window Help

Select Water Purveyor: **NORTHRIDGE WATER DISTRICT**

Well ID: 22  
Purveyor Well ID:  
State Well ID: 09N/05E-12B01  
Well Name: NOR-17

**NORTHRIDGE WATER DISTRICT - Well Inventory**

Well Location Well Construction Pump/Motor Info Geo-Aquif Info  
Wellhead Protection GW Levels GW Extraction Surface Water Well Injection  
Water Quality Well Images

**Well 22 Well Location**

| Well ID | Well Name | Agency |
|---------|-----------|--------|
| 5       | NOR-15    |        |
| 6       | NOR-11    |        |
| 7       | NOR-10    |        |
| 8       | NOR-07    |        |
| 9       | NOR-06    |        |
| 21      | NOR-14    |        |
| 22      | NOR-17    |        |
| 23      | NOR-21    |        |
| 24      | NOR-23    |        |
| 25      | NOR-22    |        |
| 26      | NOR-09    |        |
| 60      | NOR-01    |        |

Row 6 of 28

|                               |                   |
|-------------------------------|-------------------|
|                               |                   |
| Alternate Name                | WELL 17 - OAKDALE |
| Street Address                | 3710 Myrtle Ave.  |
| Nearest Cross Street          | Walt Ave.         |
| Community Area Served         | North Highlands   |
| Reference Point               |                   |
| Reference Point Location      |                   |
| Reference Point Source        |                   |
| Reference Point Datum         |                   |
| Reference Point Elevation     | 0                 |
| Ground Surface Elevation (ft) | 87.229            |

Row 0 of 0

**Well Location Plot**

Elevation (ft)

Well 22

# Building the Well Data Object

**GW DMS**  
Database Edit Print Options Window Help

Select Water Purveyor: **NORTHRIDGE WATER DISTRICT**

Well ID: 22  
Purveyor Well ID:  
State Well ID: 09N/05E-12B01  
Well Name: NOR-17

**NORTHRIDGE WATER DISTRICT - Well Inventory**

Well Location Well Construction Pump/Motor Info Geo-Aqui Info  
Wellhead Protection GW Levels GW Extraction Surface Water Well Injection

**Profile Options**

|                                     | On/Off                              | Well Color               | Layer         |
|-------------------------------------|-------------------------------------|--------------------------|---------------|
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | Lithology     |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | KValues       |
| <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> | Aquifer Zone  |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Screens       |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Ground Elevs  |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | State WellIDs |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Sanitary Seal |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | GW Elevations |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Pump Level    |
| <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> | Well Casing   |

OK Apply Cancel

Row 6 of 28

**WELL 17 - OAKDALE**  
3710 Myrtle Ave.  
Walt Ave.  
North Highlands

0  
87.229

Row 0 of 0

**Well 22 Well Location**

Bayton (MSL)

50  
0  
-50  
-100  
-150  
-200  
-250  
-300  
-350  
-400  
-450  
-500

44.72  
42.77

22

[illegible]

# Standardized Input

**GWDMS**  
Database Edit Print Options Window Help

Select Water Purveyor: **NORTHRIDGE WATER DISTRICT** Well ID: 22 Purveyor Well ID: State Well ID: 09N/05E-12B01 Well Name: NOR-17

**NORTHRIDGE WATER DISTRICT - Well Inventory**

Well 22 Lithologic Code  
Well 22 Well Location

**Well 22 Lithologic Code**

| Begin Lithologic Zone (ft) | End Lithologic Zone (ft) | Lithologic Code |
|----------------------------|--------------------------|-----------------|
| 0                          | 2                        | TPSL            |
| 2                          | 8                        |                 |
| 8                          | 30                       |                 |
| 30                         | 33                       | ASPT            |
| 33                         | 70                       | BNTN            |
| 70                         | 76                       | BREC            |
| 76                         | 81                       | CH              |
| 81                         | 92                       | CH/CL           |
| 92                         | 101                      | CH/MH           |
| 101                        | 105                      | CH/ML           |
| 105                        | 125                      | CHER            |
| 125                        | 134                      | CHLK            |
| 134                        | 145                      | CL              |
| 145                        | 146                      | CL/CH           |
| 146                        | 155                      | CL/ML           |
| 155                        | 162                      | CL/SC           |
| 162                        | 164                      | CL/SW           |
| 164                        | 168                      | CLSN            |
| 168                        | 172                      | CN              |
| 172                        | 174                      | COAL            |
| 174                        | 185                      | SP              |
| 185                        | 192                      | CL              |
| 192                        | 200                      | SC              |
| 200                        | 205                      |                 |

Row 0 of 50

**Elevation (MSL)**

Well 22

Wellhead

Water

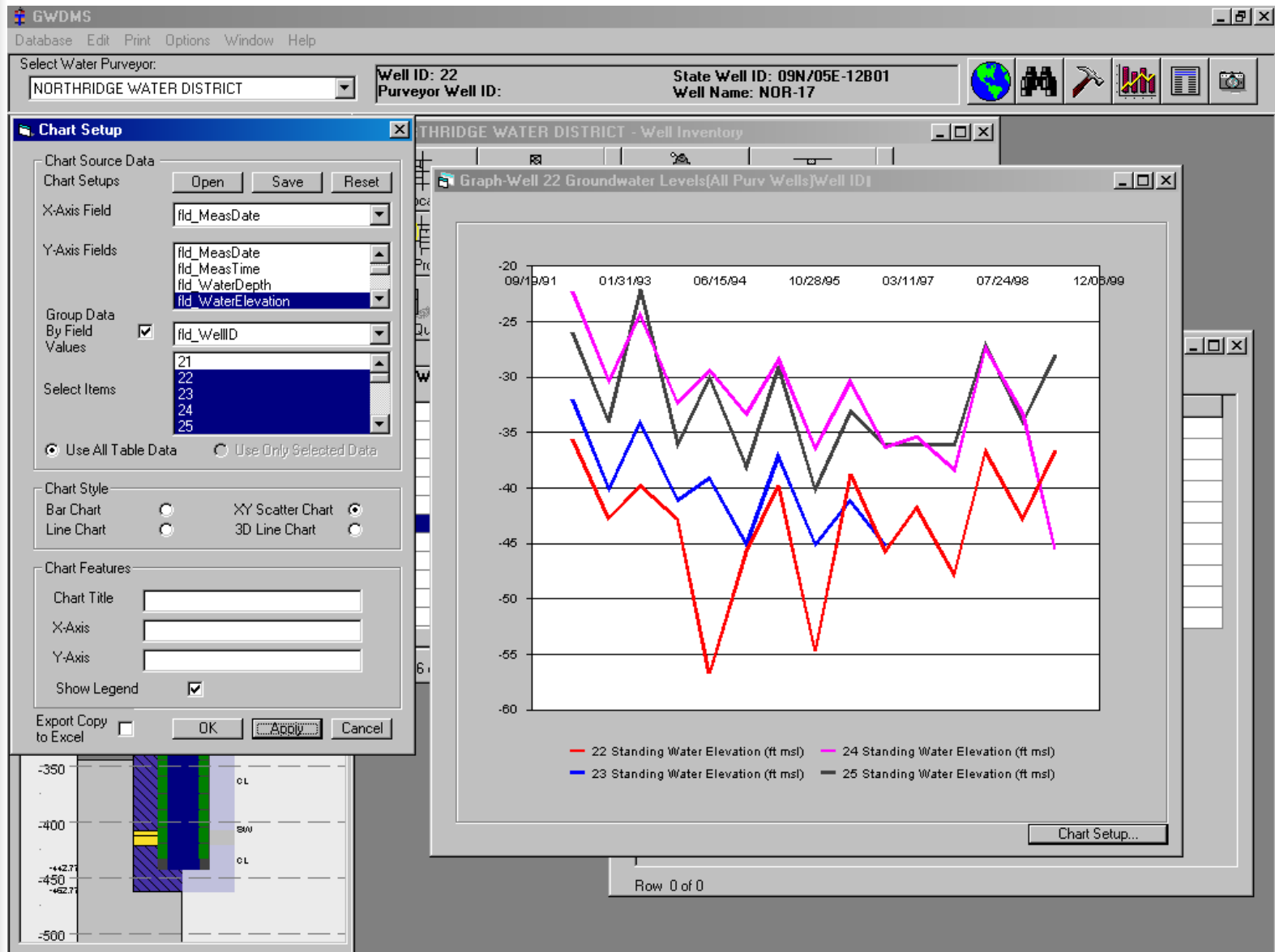
Row

Row 0 of 0

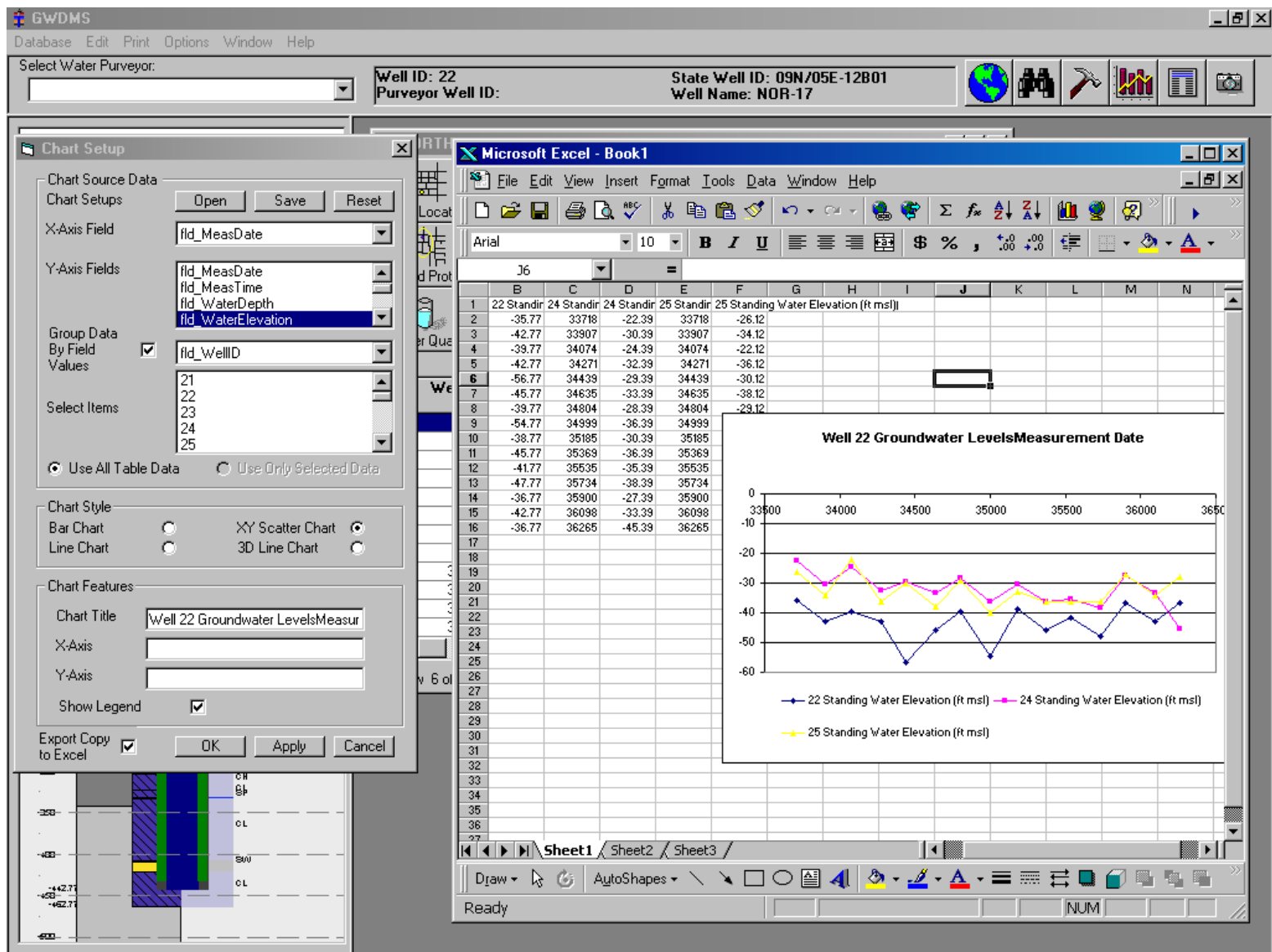
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# Data Presentation Tools

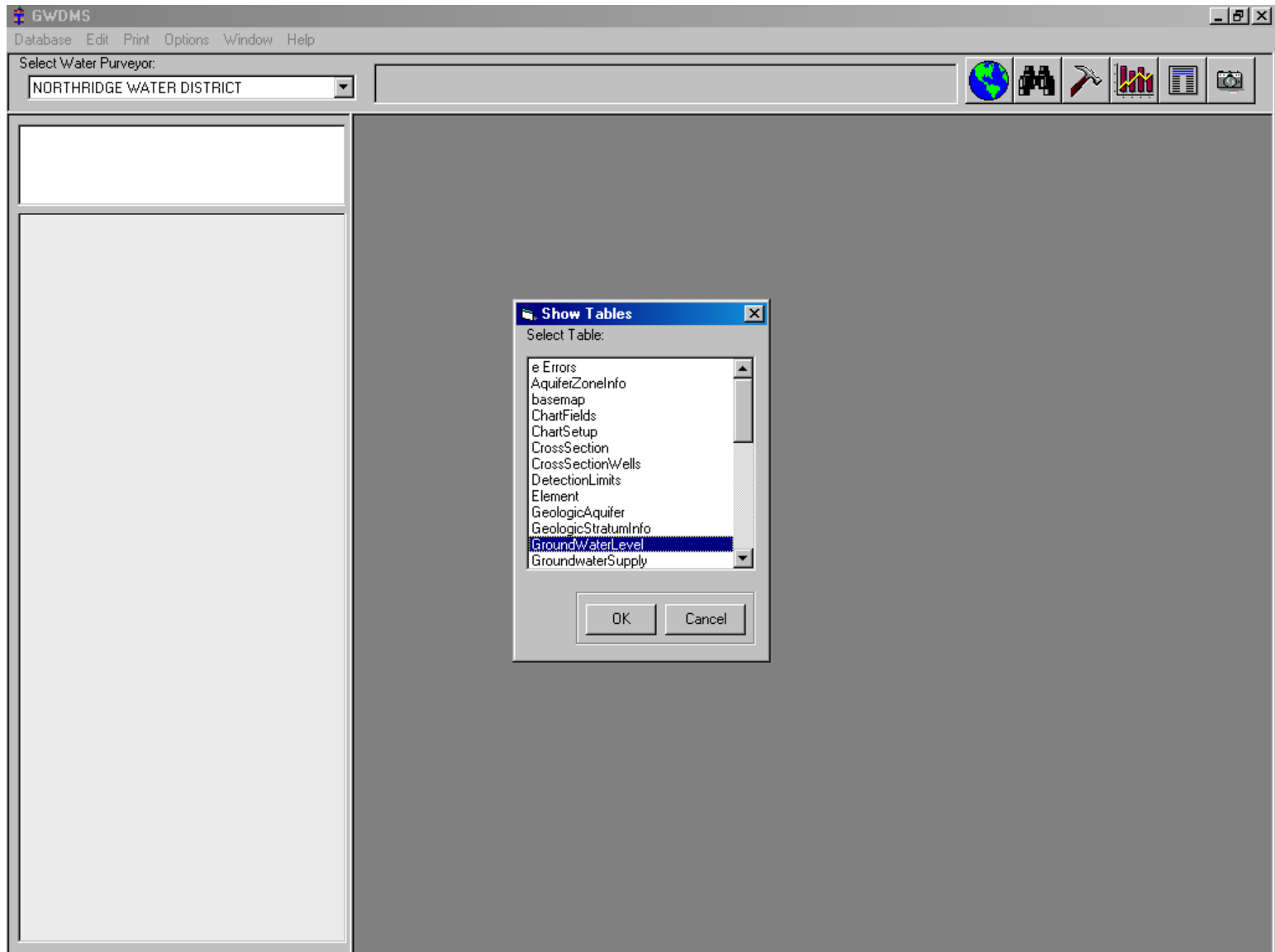


# Excel Automation





# Database Tables



# Query Builder

GWDMS - [Table Data-tbl\_GroundWaterLevel]

Database Edit Map Print Options Window Help

Select Water Purveyor:  
NORTHRIDGE WATER DISTRICT

NORTHRIDGE WATER DISTRICT - Well Inventory

**Query Builder**

Saved Queries: gwlevels

Active Form Name: NORTHRIDGE WATER DISTRICT  
Table Data-tbl\_GroundWaterLevel

Fields:

- fld\_AgencyID
- fld\_WellID
- fld\_WellName
- fld\_AgencySysID
- fld\_RegionID
- fld\_StateID
- fld\_PrimStationCode
- fld\_GroupID
- fld\_PurvWellID
- fld\_WellUse

Operators: = < >

Conjunctions: AND OR

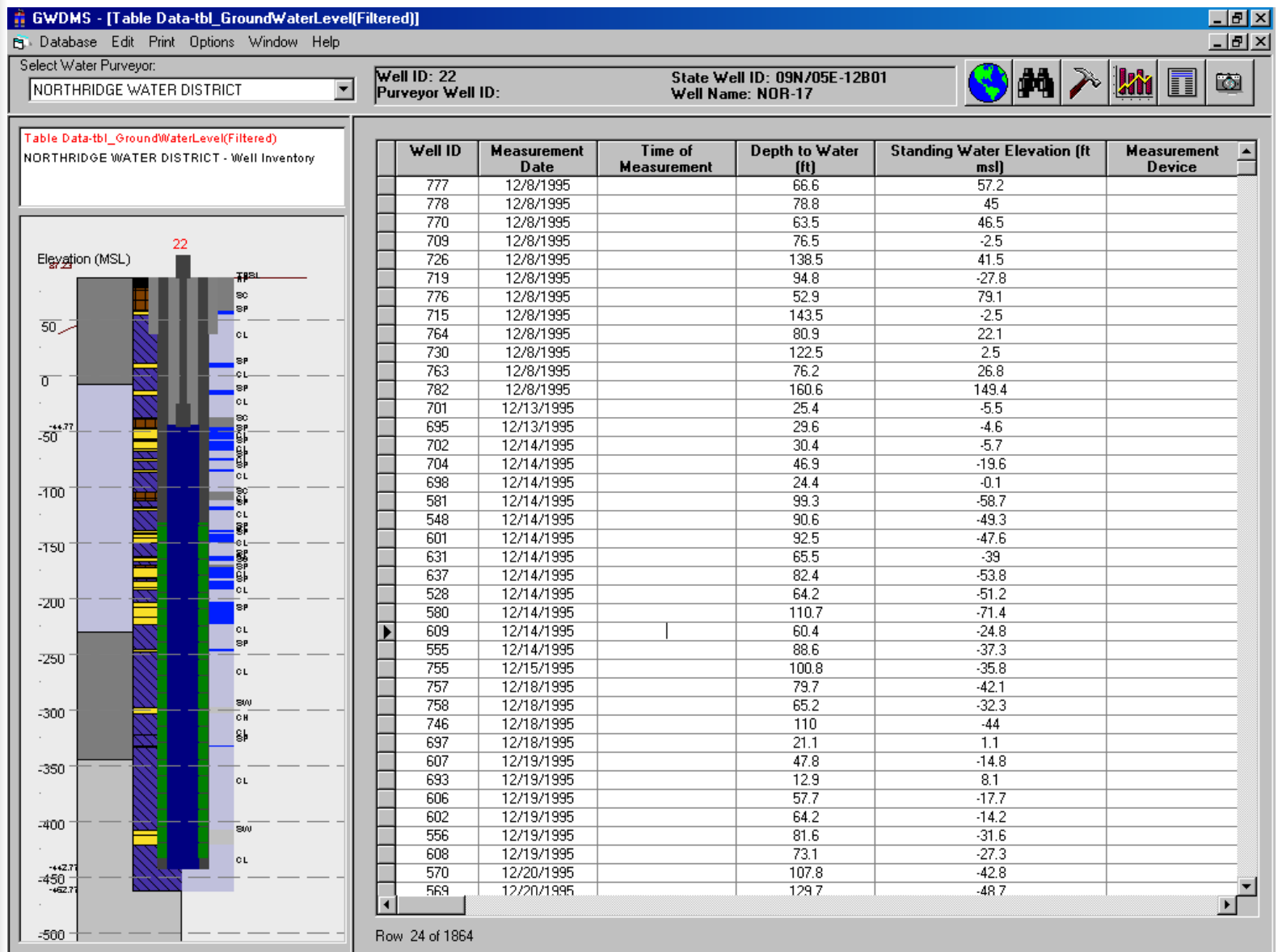
Acceptable Values:

Query Expression:  
fld\_MeasDate > #1/28/1995#

Reset

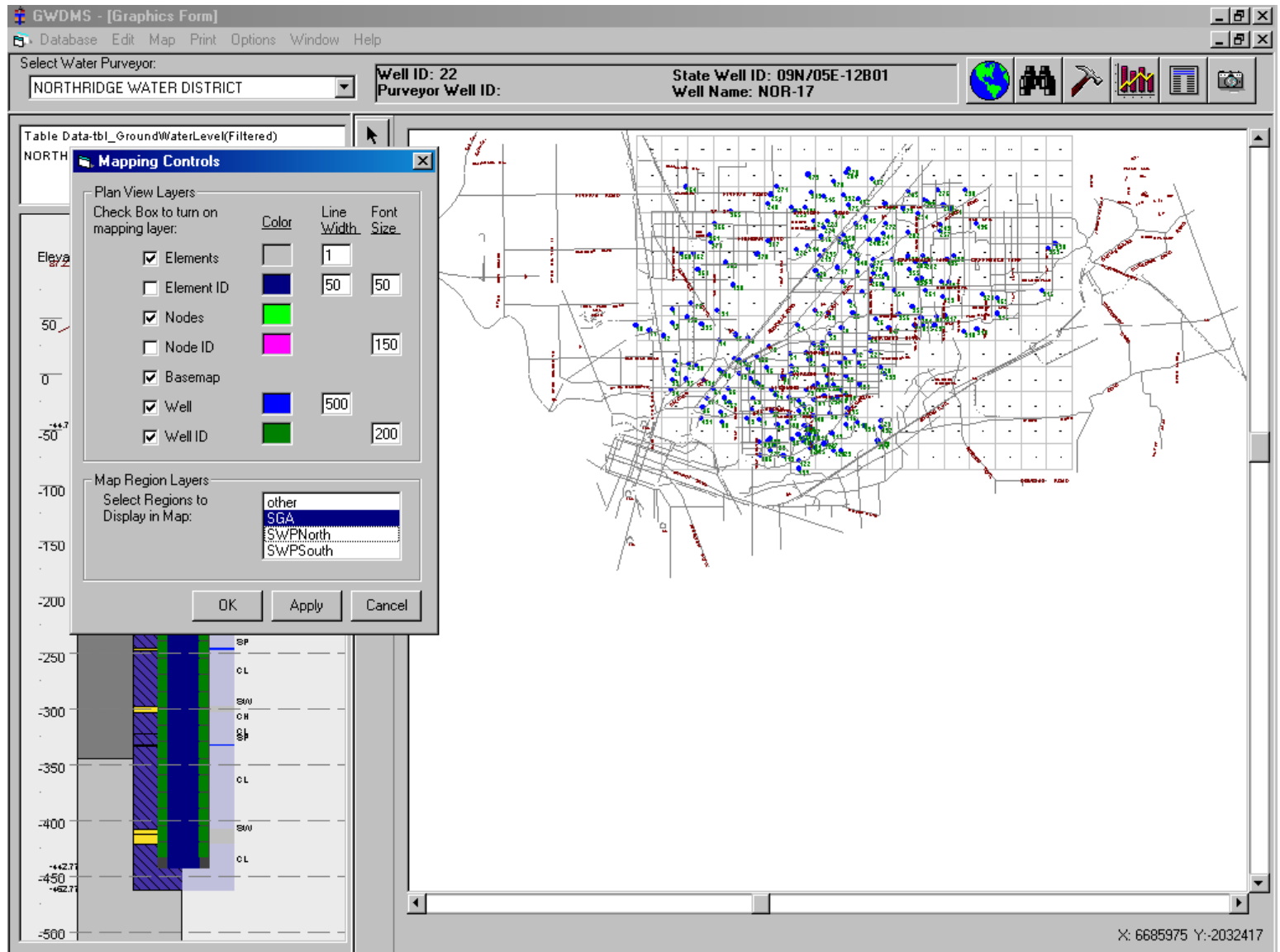
Save New Delete OK Apply Cancel

# Query Builder



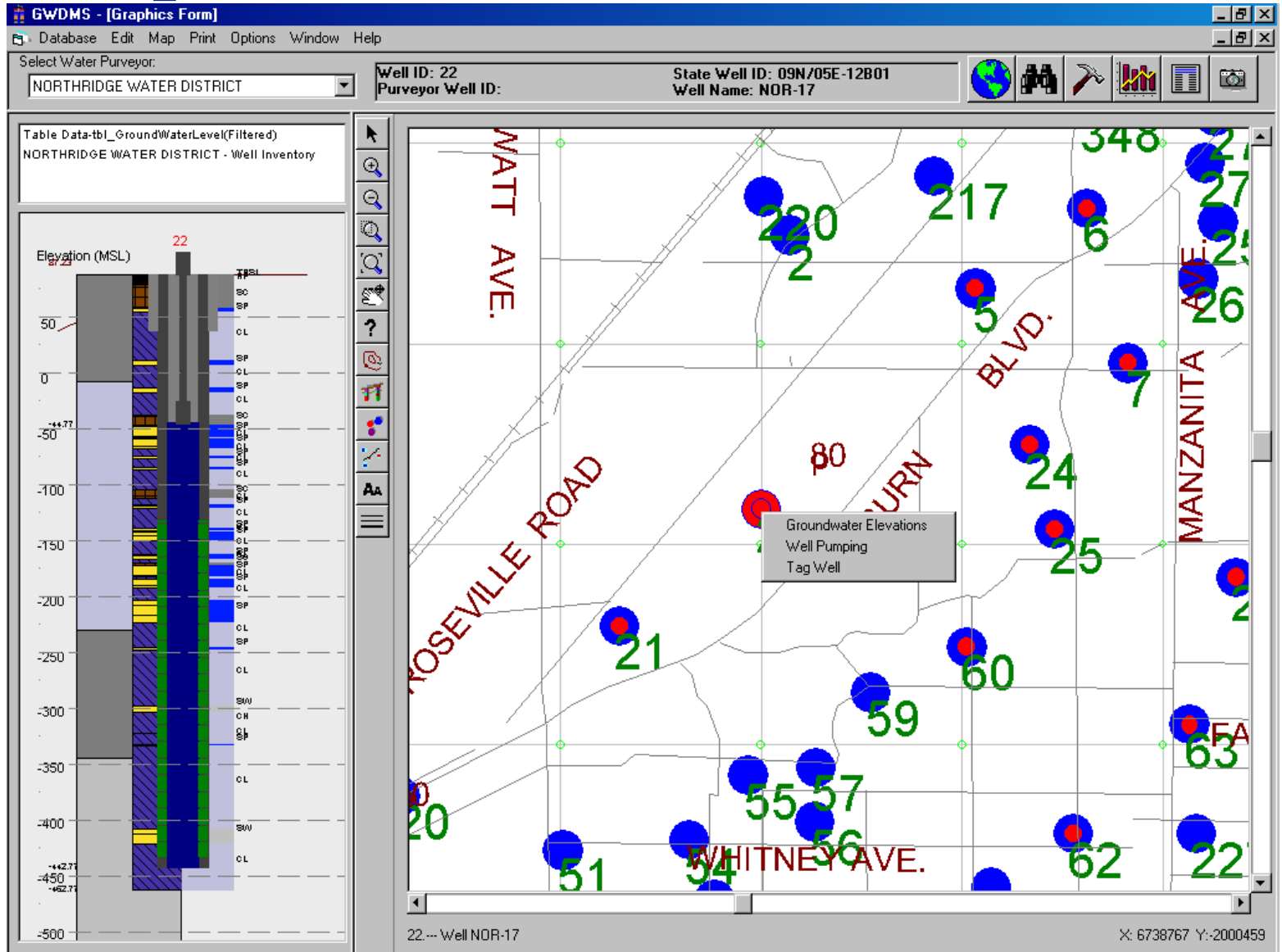
[illegible]

# Multiple Well Layers





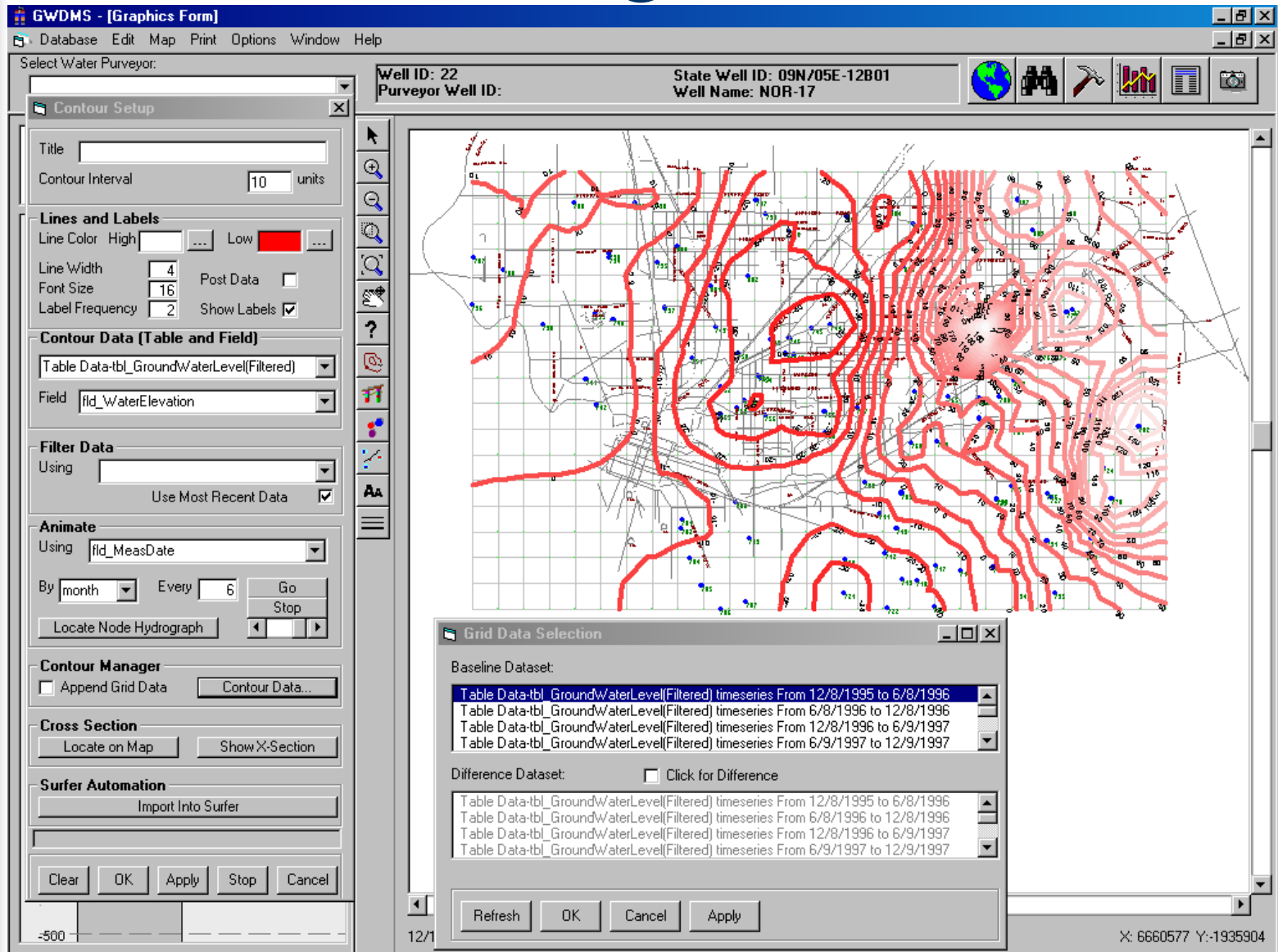
# Graphical Queries



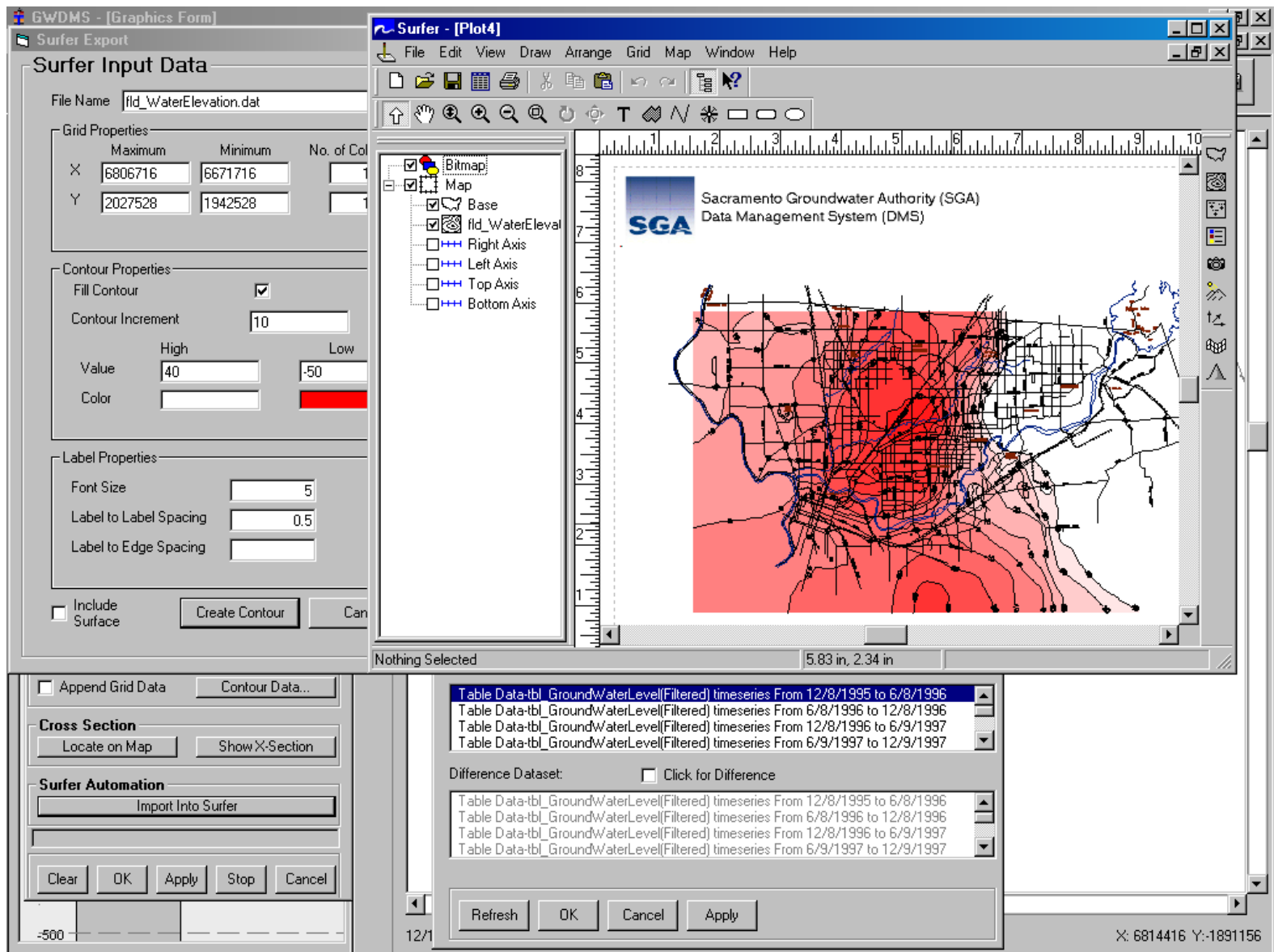
## 24



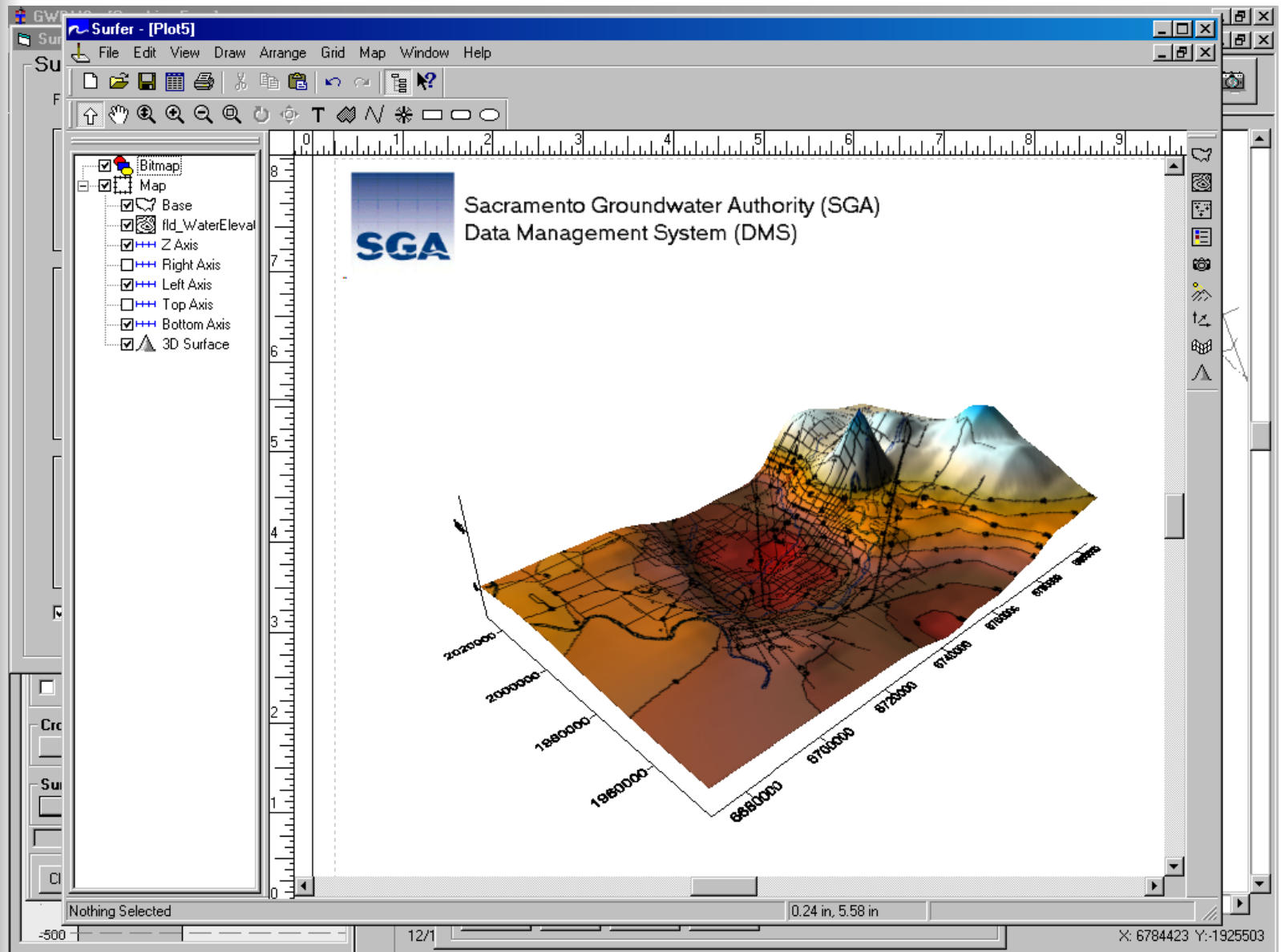
# Data Contouring and Animation



# Surfer Automation

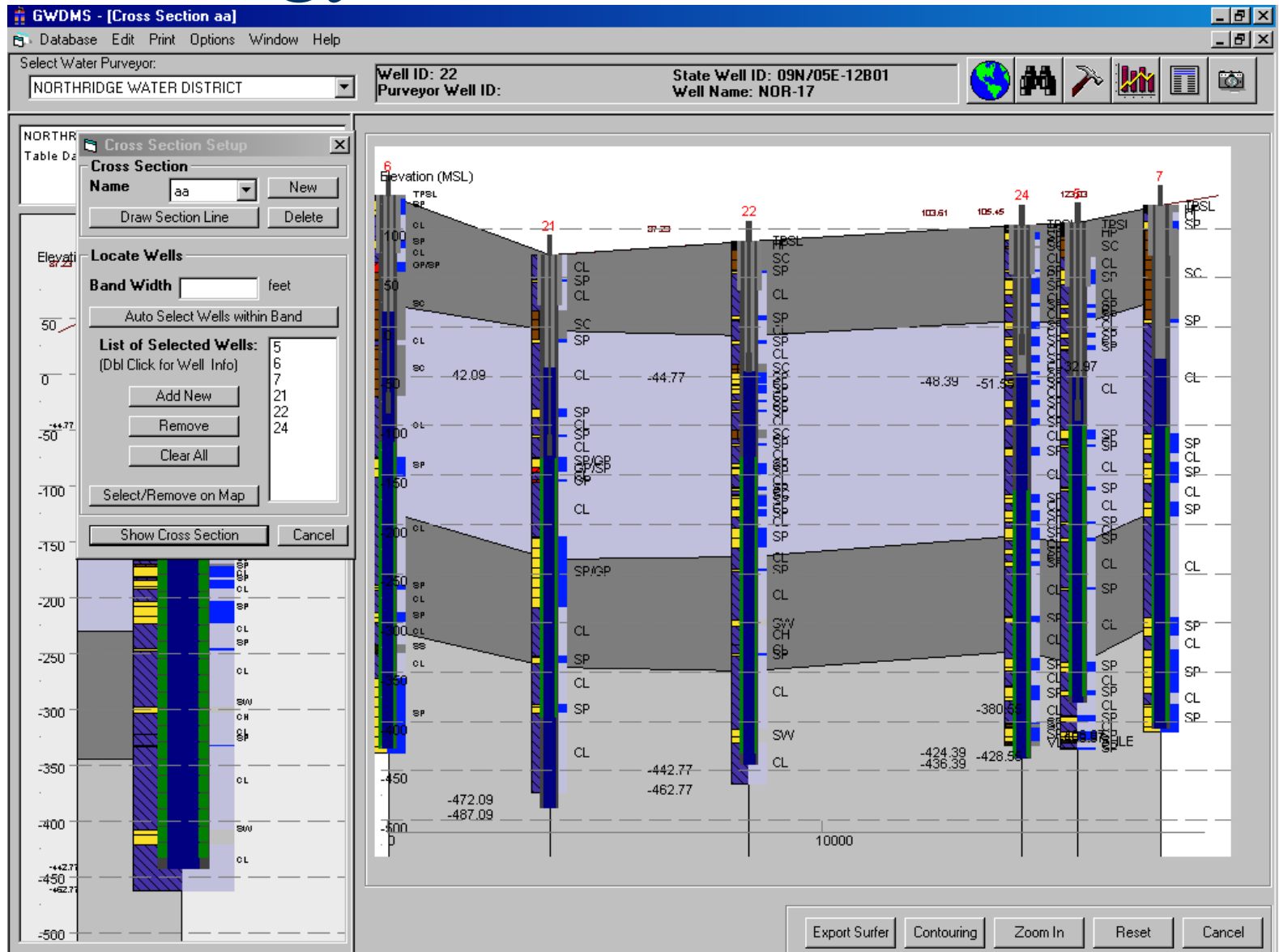


# ...And Surface Creations

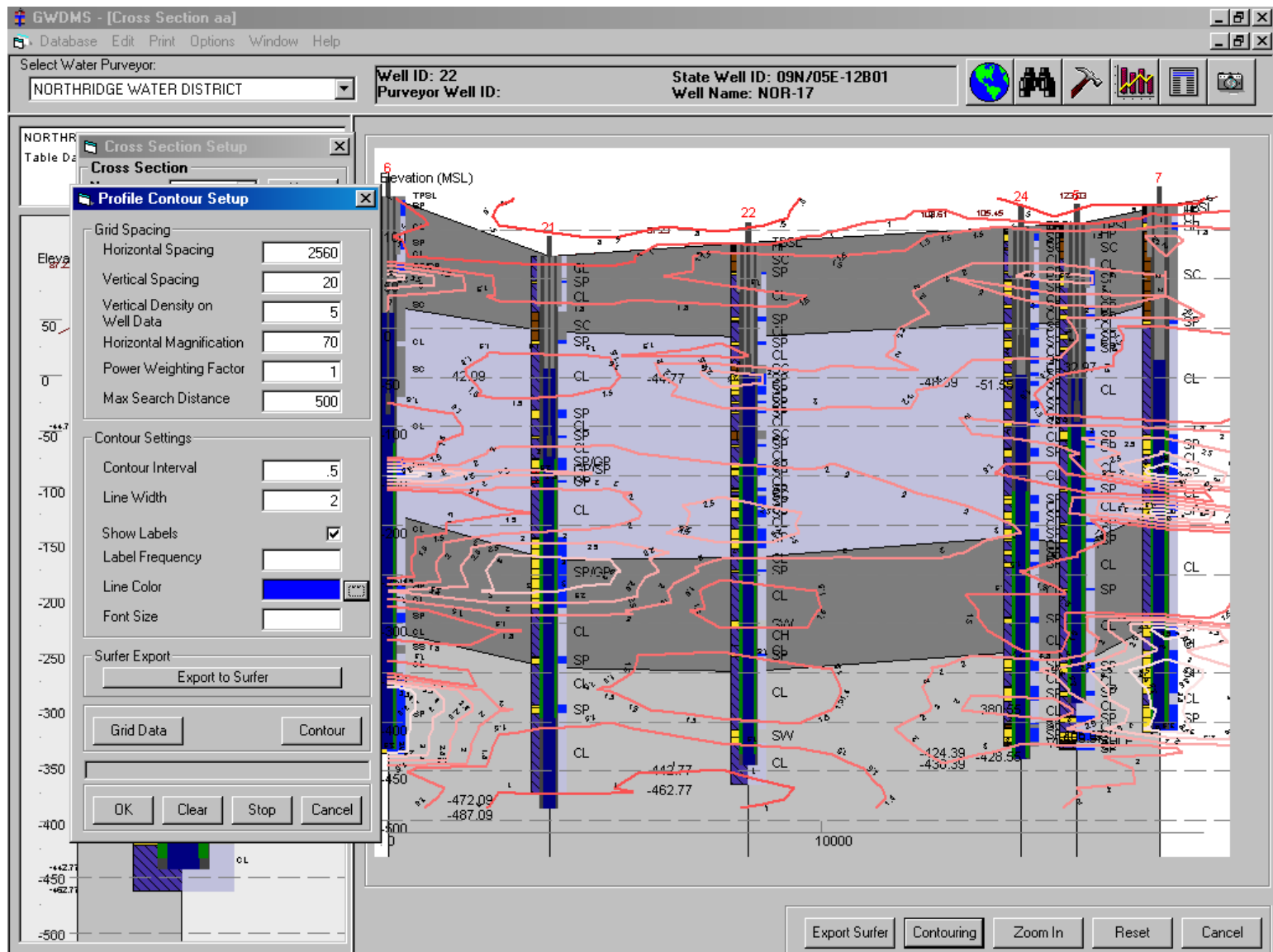




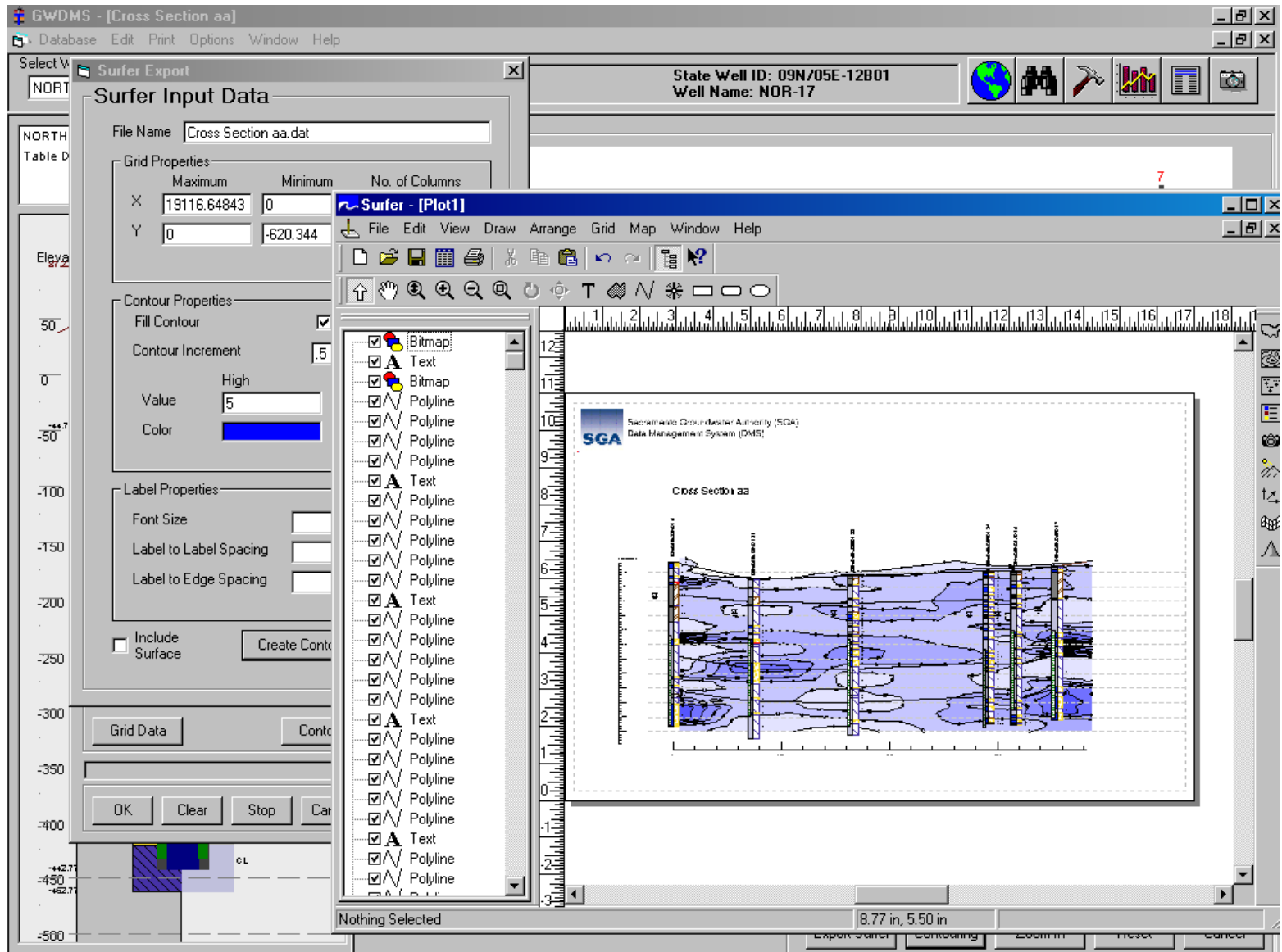
# Lithology Profiles



# K-Value Contouring

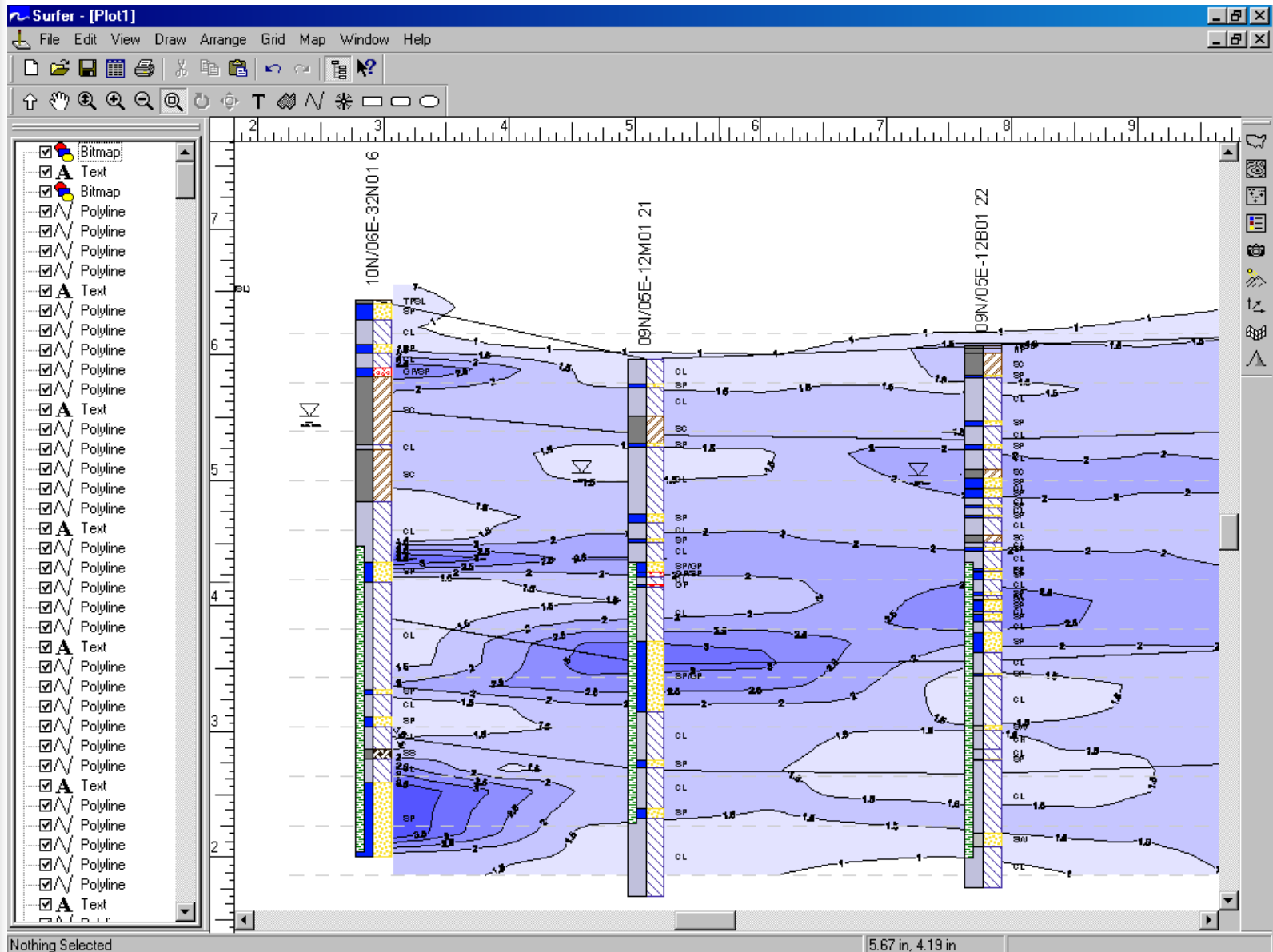


# Automated Surfer Presentation



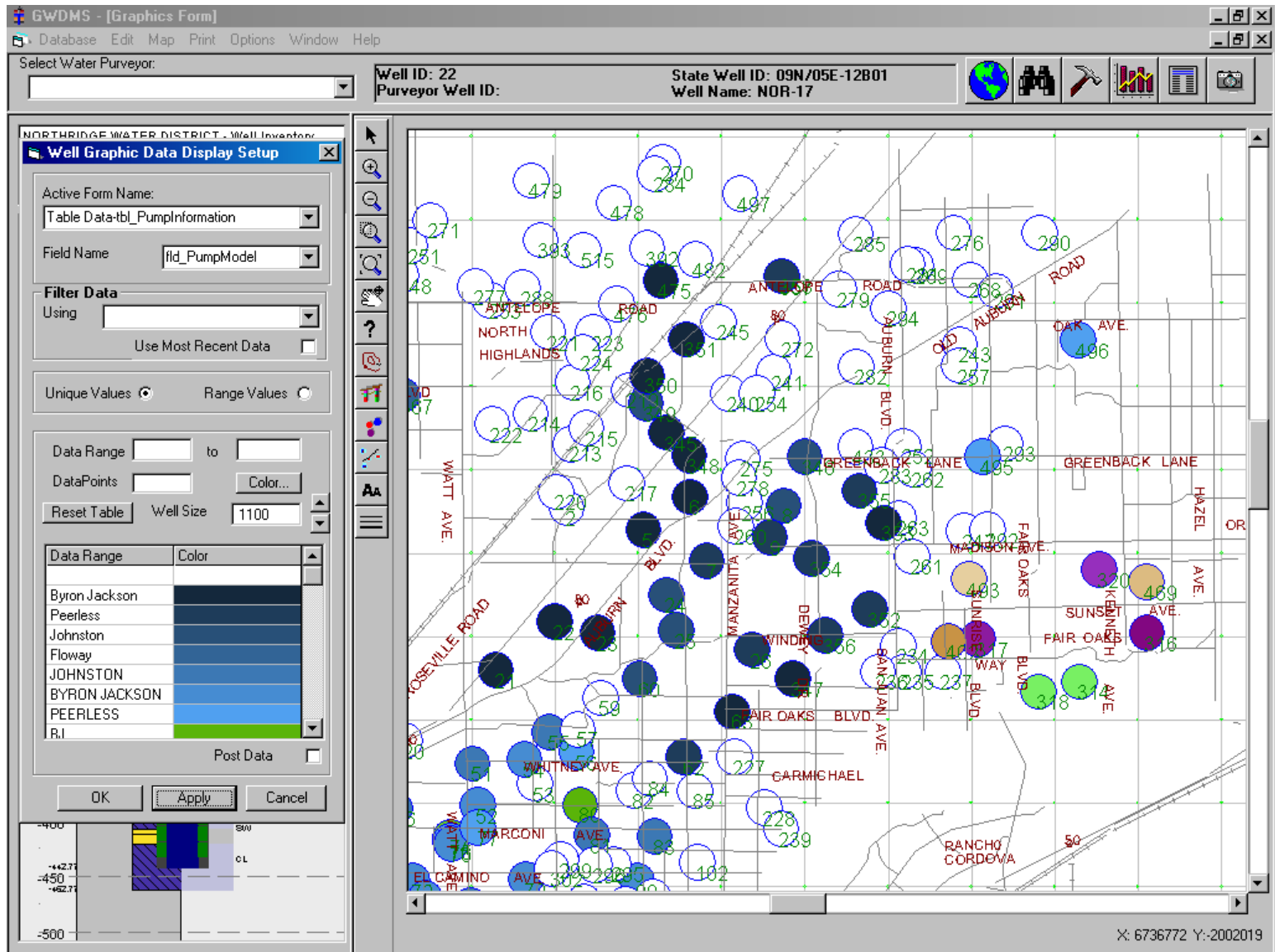


# Surfer Automation





# Well Property Graphic Display



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# Next Steps...

- Phase 2 Development
  - Data Collection and Entry
  - QA/QC Tools
  - Drinking Water Source Assessment Program
  - Agency Coordination in Use of DMS
  - Data Security Measures
- Long-term vision.....